

Examiner Chester T. Barry
Appln. of Redmon et al.
Ser. No.: 10/667,893
Response of 8/17/2005

Claims Listing

1 1. (Currently Amended) A method of controlling a biological wastewater
2 treatment process, comprising:

3 A. in at least one treatment tank containing wastewater, conducting
4 a biological process supported, at least in part, by introducing
5 oxygen-containing gas into the wastewater in the form of bubbles
6 provided in the wastewater by a gas supply system, and causing at
7 least a portion of the oxygen in said bubbles to dissolve in the
8 wastewater and at least a portion of the dissolved oxygen to be
9 consumed by the biological process

10 1. wherein the oxygen so dissolved may represent an excess
11 or a deficiency relative to the oxygen consumed by the
12 biological process, and

13 2. wherein at least one gas collection member is positioned in
14 the treatment tank to receive offgas representing gas from said
15 bubbles that has not been dissolve[[e]]d into the wastewater;

Examiner Chester T. Barry
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Response of 8/17/2005

16 B. controlling the operation of the biological process with a control
17 system that, as the process operates, exercises continuing control
18 over the process at least partially in response to measurements, that
19 are taken by the control system from the offgas collected in the gas
20 collection member and that are correlative with the amount of one or
21 more gases in the offgas; and

22 C. [[,]] utilizing data obtained through said measurements to
23 provide, in the control system, for the varying amounts of
24 consumption of oxygen that occur in the biological process, control
25 values, or components of control values, that change in response to,
26 while remaining correlative with, such varying amounts of oxygen
27 consumption, and generating control signals based on the changing
28 control values or components.

1 2. (Currently Amended) A method of controlling a wastewater treatment
2 process, comprising:

3 A. in at least one treatment tank containing wastewater, conducting
4 a biological process comprising suspended growth aeration in which
5 biological breakdown of suspended and/or dissolved waste material

Examiner Chester T. Barry
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Response of 8/17/2005

6 present in the wastewater is supported, at least in part, by
7 introducing oxygen-containing gas into the wastewater in the form of
8 bubbles provided in the wastewater by a gas supply system, which
9 bubbles rise through at least a portion of the depth of the wastewater
10 in the direction of its upper surface, and causing at least a portion of
11 the oxygen in said bubbles to dissolve in the wastewater and at least
12 a portion of the dissolved oxygen to be consumed by the biological
13 process

14 1. wherein the oxygen so dissolved may comprise an excess
15 or represent a deficiency relative to the oxygen consumed by
16 the biological process, and

17 2. wherein at least one gas collection member is positioned to
18 receive offgas representing gas from said bubbles that has not
19 been dissolved[[e]]d into the wastewater;

20 B. controlling the operation of the process with a control system
21 that, as the process operates, exercises continuing control over the
22 introduction of wastewater into the process and/or over the quantity
23 of gas discharged into the tank through said gas supply system, at
24 least partially in response to measurements of the offgas, taken by

Examiner Chester T. Barry
Appln. of Redmon et al.
Ser. No.: 10/667,893
Response of 8/17/2005

25 the control system, that are correlative with the amount of one or
26 more gases in the offgas; and

27 C. utilizing data obtained through said measurements to provide, in
28 the control system, control values which are at least in part
29 correlative with changing needs for the supply of dissolved oxygen to
30 the wastewater as determined by the control system at least partly on
31 the basis of such data.

1 3. (Original) Control system apparatus for controlling a biological
2 wastewater treatment process, comprising:

3 A. at least one gas collection member, positioned in at least one
4 wastewater processing tank in which the biological process is
5 conducted, to collect from the wastewater in the processing tank,
6 offgas representing at least a portion of oxygen-containing gas that
7 has been introduced into but not dissolved in the wastewater,

8 B. at least one measuring device comprising at least one gas
9 detector that is connected with the gas collection member and that
10 can take measurements and thereby provide data indicative of the

Examiner Chester T. Barry
Appn. of Redmon et al.
Ser. No.: 10/667,893
Response of 8/17/2005

11 amount of at least one gas in the offgas collected by the gas
12 collection member, and

13 C. at least one controller which is connected with the measuring
14 device, which defines, for the varying amounts of consumption of
15 oxygen that occur in the biological process, control values, or
16 components of control values, that change in response to, while
17 remaining correlative with, such varying amounts of oxygen
18 consumption, which controller generates control signals based on the
19 control values or components.

1 4. (Currently Amended) A control system for controlling wastewater
2 treatment apparatus of the type that comprises at least one tank for
3 conducting a biological process comprising suspended growth aeration on
4 wastewater, a gas supply system for introducing oxygen-containing gas
5 into the wastewater in the form of bubbles and causing at least a portion of
6 the oxygen in said bubbles to dissolve in the wastewater and at least a
7 portion of the dissolved oxygen to be consumed by the biological process,
8 wherein the oxygen so dissolved may comprise an excess or represent a
9 deficiency relative to the oxygen consumed by the biological process, and
10 wherein at least one gas collection member is positioned to receive offgas

Examiner Chester T. Barry
Appln. of Redmon et al.
Ser. No.: 10/667,893
Response of 8/17/2005

11 representing gas from bubbles that have not been not dissolve[[e]]d into
12 the wastewater; said control system comprising:

13 A. at least one gas detector that can take measurements of the
14 amount of at least one gas collected in the gas collection member,

15 B. at least one DO (dissolved oxygen) detector having a probe that,
16 when in contact with the wastewater in the tank, can take
17 measurements of the DO level of the wastewater, and

18 C. at least one controller containing or having access to code which
19 the controller can utilize with said measurements to provide, in the
20 control system, control values which are at least in part correlative
21 with changing needs for the supply of dissolved oxygen to the
22 wastewater.